



Massachusetts Department of Environmental Protection
Bureau of Waste Prevention – Industrial Wastewater
BWP IW 38 & BWP IW 39
Permit for Industrial Sewer User

W205294
Transmittal Number
130539
Facility ID# (if known)



Important Instructions for Completing This Form

The questions on this form apply to existing and new facilities discharging industrial wastewater to sewers. If you are completing this form for an existing facility, answer the questions as they apply to its current status. If you are completing this form for a new facility, your answers will reflect your commitment to comply with the requirements as set forth in each question.

Existing facilities are defined as facilities in existence as of July 12, 2007. New facilities are defined as facilities constructed after July 12, 2007.

Answer all questions, except those that you are directed to skip. Please DO NOT answer questions that you are directed to skip

Permit Category (Select One)

- ☒ BWP IW 38: Industrial Sewer User in IPP POTW discharging more than 50,000 GPD
☐ BWP IW 39: Industrial Sewer User in Non-IPP POTW discharging more than 25,000 GPD

A. Facility Information

Important:
When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



Allegro MicroSystems, Inc.

1a. Facility Name

115 Northeast Cutoff

1b. Facility Address 1

1c. Facility Address 2

Worcester

1d. City

508 854-5560

1g. Phone Number

223056180

1i. Federal Employer Tax Identification Number (FEIN or TIN)

MA

1e. State

508 856-7435

1h. Fax Number

01606

1f. Zip Code

Mailing Address: ☐ Check here if same as Facility Address and skip to Contact Information.

P.O. Box 15036

2a. Mailing Address: Street or P.O. Box

2b. Mailing Address 2

Worcester

2c. City

MA

2d. State

01615

2e. Zip Code

Contact Information:

Donald W. Alger

3a. Contact Person Name

Senior Environmental Engineer

3b. Contact Person Title

508 854-5560

3c. Phone Number

3d. Extension

dalger@allegromicro.com

3e. Email Address



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B. Industrial Wastewater Information

1. Project Description (Check All That Apply)

- ☐ 1a. New Construction ☐ 1b. Permit Renewal
- ☐ 1c. Increasing Flow From Existing Connection ☐ 1d. New or Modified Industrial Wastewater Pretreatment System (IWPS)
- ☒ 1e. Existing Unpermitted Connection
(Constructed Before 7/12/07)

2. List, in descending order of significance, the Standard Industrial Classification (SIC) codes, which best describe the facility producing the discharge in terms of the principal products or services provided. Also, specify each classification title. (See Appendix B in the Instructions)

3674	Semiconductors & Related Devices
2a. SIC Code	Description
2b. SIC Code	Description
2c. SIC Code	Description
2d. SIC Code	Description

3. List all sewer connection(s) and their maximum daily flow(s) in gallons per day (GPD) from your facility going to the Publicly Owned Treatment Works (POTW):

	1 3a. Connection #	2 3b. Connection #	3 3c. Connection #	3d. Total Flow, All Connections
SANITARY	0 GPD	0 GPD	0 GPD	GPD
INDUSTRIAL	36000 GPD	220000 GPD	2000 GPD	GPD
TOTAL	36000 GPD	220000 GPD	2000 GPD	GPD

4. Are you in compliance with the Massachusetts Historical Commission requirements?

☒ Yes

☐ No*

*If No, You Must Comply With Massachusetts Historical Commission Requirements **BEFORE** You Can Submit This Application.

5. Are you in compliance with Massachusetts Environmental Policy Act (MEPA) requirements?

☒ Yes

☐ No*

*If No, You Must Comply With MEPA Requirements **BEFORE** You Can Submit This Application.



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3674	Semiconductors & Related Devices
2a. SIC Code	Description
2b. SIC Code	Description
2c. SIC Code	Description
2d. SIC Code	Description

3. List all sewer connection(s) and their maximum daily flow(s) in gallons per day (GPD) from your facility going to the Publicly Owned Treatment Works (POTW):

	4 3a. Connection #	3b. Connection #	3c. Connection #	3d. Total Flow, All Connections
SANITARY	30000 GPD	GPD	GPD	30000 GPD
INDUSTRIAL	0 GPD	GPD	GPD	258000 GPD
TOTAL	30000 GPD	GPD	GPD	288000 GPD

4. Are you in compliance with the Massachusetts Historical Commission requirements?

☒ Yes

☐ No*

*If No, You Must Comply With Massachusetts Historical Commission Requirements **BEFORE** You Can Submit This Application.

5. Are you in compliance with Massachusetts Environmental Policy Act (MEPA) requirements?

☒ Yes

☐ No*

*If No, You Must Comply With MEPA Requirements **BEFORE** You Can Submit This Application.



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B. Industrial Wastewater Information (continued)

6. Check all pollutants that are present in your industrial wastewater **before** pretreatment, or if not treated, before discharge:

☐ 6a. Metals, Asbestos, Cyanide, Phenols

If Metals, Asbestos, Cyanide, or Phenols are present, provide concentrations in milligrams per liter (mg/L):

1. Antimony (total) (Sb)	<0.01 mg/L	9. Nickel (total) (Ni)	<0.01 mg/L
2. Arsenic (total) (As)	<0.003 mg/L	10. Selenium (total) (Se)	<0.01 mg/L
3. Beryllium (total) (Be)	<0.001 mg/L	11. Silver (total) (Ag)	<0.01 mg/L
4. Cadmium (total) (Cd)	<0.1 mg/L	12. Thallium (total) (Tl)	<0.2 mg/L
5. Chromium (hexavalent)	<0.01 mg/L	13. Zinc (total) (Zn)	<0.02 mg/L
6. Chrome (total) (Cr)	<0.02 mg/L	14. Asbestos	not applicable mg/L
7. Copper (total) (Cu)	<0.01 mg/L	15. Cyanide (total) (CN)	<0.01 mg/L
8. Lead (total) (Pb)	<0.1 mg/L	16. Phenols (total)	<0.5 mg/L

☒ 6b. Toxic Pollutants (See Section 17B in the Instructions.)

If Toxic Pollutants are present, provide the total Toxic Pollutants concentration in micrograms per liter (ug/L):

<465 (all values below MDL)

6b1. Total Toxic Pollutants Concentration (ug/L)

NOTE: Use the **Toxic Pollutants Form** to list individual toxic chemicals and their concentrations.

☐ 6c. Total Petroleum Hydrocarbons (TPH) > 15 mg/L

☒ 6d. pH <5 and >10 Standard Units (S.U)

☐ 6e. Other*

*If Other Pollutants are present, describe them:



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B. Industrial Wastewater Information (continued)

7. Is Mercury (Hg) present in your industrial wastewater **before** pretreatment, or if not treated, before discharge?

☐ Yes

☒ No*

*If No, skip to Question 8.

7a. If Yes, have you identified all possible mercury sources and taken all reasonable steps to eliminate the mercury?

☐ Yes*

☐ No

*If Yes, skip to Question 8.

7b. If No, explain why.

NOTE: As of May 1, 2009, all facilities must meet a discharge limit of 1 part per billion (ppb) for Mercury.

8. What is the name of the Publicly Owned Treatment Works (POTW) that receives your wastewater? (See Appendix C in the Instructions.)

Upper Blackstone Water Pollution Abatement
District

Name of POTW

9. Do you have a current sewer connection discharge permit or a current written approval issued by your local POTW? (See Section 17B in the Instructions.)

☒ Yes

☐ No*

*If No, you must obtain either a permit or, if a permit is not required, a written approval from your local POTW to discharge **BEFORE** you can submit this application.

If you have a permit, provide the following information, then skip to Question 10.

353

9a. Permit Number

07/31/2009

9b. Permit Expiration Date

If you have a written approval, provide the following information:

08/03/2004

9c. Date of Approval Letter

Joe Hogan

9d. Name of Person Who Signed the Letter

10. Are your POTW and local Sewer Authority the same entity? (See Section 17B in the Instructions.)

☒ Yes*

☐ No

*If Yes, skip to Question 12.



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B. Industrial Wastewater Information (continued)

11. Do you have a current sewer connection discharge permit or a current written approval issued by your local Sewer Authority? (See Section 17B in the Instructions.)

☐ Yes

☐ No*

If No, you must obtain either a permit or written approval from your local Sewer Authority to discharge **BEFORE** you can submit this application.

If you have a permit, provide the following information, then skip to Question 12.

11a. Permit Number

11b. Permit Expiration Date

If you have a written approval, provide the following information:

11c. Date of Approval Letter

11d. Name of Person Who Signed the Letter

12. Is your facility currently classified as a Categorical Industrial User (CIU) pursuant to Federal Regulations? (See Appendix D in the Instructions.)

☒ Yes

☐ No*

*If No, skip to Section C.

12a. List all the Categorical Pretreatment Standards applicable to your facility.

469

12a1. Part Number

Electrical and Electronic Components

Point Source Category

12a2. Part Number

Point Source Category

12a3. Part Number

Point Source Category

12a4. Part Number

Point Source Category

C. Industrial Wastewater Pretreatment System

1. Do you have an on-site industrial wastewater pretreatment system (IWPS) to treat your industrial wastewater?

☒ Yes

☐ No*

*If No, skip to Section D.

1a. How many IWPSs do you have?

1

Number

NOTE: If you have more than one IWPS, please use an Additional IWPS Form for each additional IWPS.

1b. Provide a unique identifier (i.e. name) for this IWPS:

DI Building pH adjustment system

Identifier/Name



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C. Industrial Wastewater Pretreatment System (continued)

1c. What is the Total Design Capacity of this IWPS?

840000

Gallons Per Day

1d. What is the Average Daily Flow of this IPWS? (Estimate if this is a new facility.)

110000

Gallons Per Day

1e. What is the Maximum Daily Flow of this IWPS? (Estimate if this is a new facility.)

220000

Gallons Per Day

2. Is your IWPS designed and constructed to meet all local discharge standards and the applicable Categorical Industrial User (CIU) standards in 40 CFR Chapter I, Subchapter N?

☒ Yes

☐ No*

*If No, you must take immediate steps to address the non-compliance **BEFORE** you can submit this application.

3. Does this IWPS treat hazardous industrial wastewater or hazardous industrial wastewater sludge as defined in 314 CMR 7.02?

☒ Yes

☐ No*

*If No, skip to Question 12.

3a. Are you treating concentrated chemical baths, e.g. spent chemical baths, or off-specification products?

☒ Yes

☐ No*

*If No, skip to Question 4.

3b. If Yes, describe the concentrated chemical baths you are treating.
Waste chemicals such as HF (49% concentration), H₂SO₄ (100%), HNO₃(71%), H₃PO₄(85%), NH₄OH(31%), and H₂O₂(30%) from the wafer fabrication process. The largest quantity of any one chemical dump would be approximately 6 gallons These are diluted in the process wastewater drain with the spent high purity water that has been used to rinse the chemicals from the wafers. The H₂SO₄ dumps are intentionally aspirated and mixed with a considerable amount of water during the dumps beacuse heat is generated when it mixes with water.

4. Does your IWPS meet the requirements of "treatment which is an integral part of the manufacturing process" as defined in 310 CMR 30.010?

☐ Yes*

☒ No

*If Yes, skip to Question 7.

5. Do you store hazardous industrial wastewater or hazardous industrial wastewater sludge that is generated in your IWPS or in your production processes, in tanks or containers?

Note: If you use in-ground tanks for storage of hazardous industrial wastewater or sludge and your IWPS is located in a Drinking Water Zone (see Section 17C of the Instructions; reference language in 310 CMR 30.605), you are not eligible to apply for a BWP IW 38 or BWP IW 39 permit. You must use form BWP IW 40 instead.

☒ Yes

☐ No*

*If No, skip to Question 7.



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C. Industrial Wastewater Pretreatment System (continued)

6. Are you in compliance with the requirements for tanks and containers in 310 CMR 30.342 and 343? (See Section 17C in the Instructions)

☒ Yes

☐ No*

*If No, you must take immediate steps to address the non-compliance **BEFORE** you can submit this application.

7. Do you have a U.S. Environmental Protection Agency (EPA) hazardous waste generator identification number?

☒ Yes

☐ No*

*If No, skip to Question 7b.

7a. What is your EPA identification number?

MAD002423267

Skip to Question 8.

EPA ID #

7b. Explain why you do not have an EPA identification number.

8. Do you have a visible sign in place that warns against unauthorized entry into the IWPS area?

☒ Yes*

☐ No

*If Yes, skip to Question 9.

8a. Explain why you do not have a visible sign in place.

9. Do you have the required spill containment for the IWPS? (See Section 17C in the Instructions.)

☒ Yes*

☐ No

*If Yes, skip to Question 10.

9a. Explain why you do not have the required spill containment.

10. Is your IWPS located on land subject to flooding from a 100-year storm? (See Section 17C in the Instructions.)

☐ Yes

☒ No*

*If No, skip to Question 12.



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C. Industrial Wastewater Pretreatment System (continued)

11. Are you in compliance with the flood-proofing provisions in 310 CMR 30.701(2)? (See Section 17C in the Instructions.)

☐ Yes

☐ No*

*If Yes, skip to Question 12.

11a. Explain why you are not in compliance with the flood-proofing provisions in 310 CMR 30.701(2).

12. What type of IWPS do you have? (Check all that apply.)

☐ Fully Automated Industrial Wastewater Pretreatment System (FAIWPS)

☒ Continuous Discharge IWPS

☐ Batch IWPS

13. Is the IWPS exempt from classification? (See Section 17C in the Instructions.)

☐ Yes*

☒ No

*If Yes, skip to Question 14.

13a. What is the classification of this IWPS? (See 257 CMR 2.13: Classification of Wastewater Treatment Facilities.)

☒ Class 1I

☐ Class 2I

☐ Class 3I

☐ Class 4I

☐ Class 5 or 6C

☐ Class 1M

☐ Class 2M

☐ Class 3M

☐ Class 4M

13b. How was the IWPS' classification determined?

☐ In accordance with the requirements in 314 CMR 7.05(2)(g) 4. c. or d.

☒ By the Board of Certification of Operators of Wastewater Treatment Facilities

☐ Both

14. Is the IWPS staffed in accordance with the requirements of 314 CMR 7.05(2)(g) 5? (See Section 17C in the Instructions.)

☒ Yes*

☐ No

*If Yes, skip to Question 15.



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C. Industrial Wastewater Pretreatment System (continued)

14a. Explain why the IWPS is not staffed in accordance with 314 CMR 7.05(2)(g) 5.

15. Is this your first permit application under Permit Category BWP IW 38 or BWP IW 39 for this IWPS? Or, is this application a request for modification of this IWPS that currently has a BWP IW 38 or BWP IW 39 permit?

☒ Yes*

☐ No

*If Yes, you need to submit as an attachment the process flow diagram and description of the principal treatment processes for your IWPS. Otherwise, skip to Question 17.

16. How many attachments are included with this application in response to Question 15?

3 – Attachments 2, 3 and 4

Number of Attachments

17. Have your sewer connection and IWPS been designed and constructed in compliance with the design and construction standards as set forth in 314 CMR 7.05(2)(g)3?

☒ Yes

☐ No*

*If No, skip to Question 17b.

17a. What is the Massachusetts Registered Professional Engineer (MAPE) signature date on the engineering plans?

January 9, 2008

Skip to Question 18.

Date

17b. Explain why your sewer connection and IWPS have not been designed and constructed in compliance with the design and construction standards as set forth in 314 CMR 7.05(2)(g)3.

18. Provide the following information about the Massachusetts Registered Professional Engineer (MAPE) who reviewed, stamped, and signed your engineering plans:

J. Andrew Irwin

18a. Name

38968

18c. Mass. P.E. License Number

508 653-8007

18b. Phone Number

Chemical

18d. Mass. P.E. Specialty



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C. Industrial Wastewater Pretreatment System (continued)

19. Do you have an IWPS operation and maintenance manual that complies with the procedures and other requirements in 314 CMR 7.05(2)(g)6.?

☒ Yes*

☐ No

*If Yes, skip to Question 20.

19a. Explain why you do not have the required IWPS operation and maintenance manual.

20. Are you keeping your IWPS operation and maintenance manual current?

☒ Yes

☐ No

21. Are you implementing your IWPS operation and maintenance manual?

☒ Yes

☐ No

D. Monitoring, Reporting & Recordkeeping

1. Are you keeping your currently effective sewer discharge permit(s), IWPS plan(s), and current operation and maintenance manual(s) (as applicable) on-site at all times?

☒ Yes*

☐ No

* If Yes, skip to Question 2.

1a. Explain why you are not keeping these records on-site at all times.

2. Are you keeping all your required records including your wastewater monitoring and analyses records, operation and maintenance records and logs, bills of lading, summary reports of all incidents requiring implementation of the safety plan, and hazardous waste manifests (as applicable) on-site for at least three years?

☒ Yes*

☐ No

* If Yes, skip to Question 3.

2a. Explain why you are not keeping these records on-site for at least three years.



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D. Monitoring, Reporting & Recordkeeping (continued)

3. [Reserved for Toxics Reporting]

Additional reporting requirements will be added to this section in the future.

E. General & Specific Prohibitions

1. After carefully reviewing all of the general and specific prohibitions listed below, are you in compliance with these General and Specific Prohibitions?

☒ Yes*

☐ No

*If Yes, read Section F and then complete Section G.

1a. Identify all the prohibitions you are not in compliance with and explain why. Attach an additional sheet of paper to this form, if necessary.

1. General Prohibitions. The permittee shall not:

a. Discharge, or cause to be discharged to a POTW, any substances, materials, or wastewater that may:

i. harm the sewers, POTW wastewater treatment process or equipment;

ii. have an adverse impact on the receiving waters; or

iii. otherwise create a nuisance or endanger public health, safety, or the environment.

b. Introduce pollutants into POTWs that pass through the POTW or interfere with its operation or performance.

c. Discharge wastewater or allow discharge of wastewater through any sewer connection that would result in a hazard to the public health or safety.

d. Discharge bypass wastewater or allow discharge of bypass wastewater through any sewer connection. If bypassing due to an emergency condition occurs, the Department and POTW shall be notified in accordance with 314 CMR 7.04(3). Such notification or its acknowledgement shall not be construed as permission by the Department or POTW to discharge bypass wastewater.

e. Discharge hazardous waste or allow the discharge of hazardous waste through any sewer connection.

2. Specific Prohibitions. The permittee shall not introduce into a POTW or its wastewater collection system the following:

a. Pollutants which may create a fire, explosion, or other hazard in the POTW or its wastewater collection system.

b. Pollutants which may cause corrosive structural damage to the POTW or its wastewater collection system. In no case shall discharges with a pH lower than 5.0 Standard Unit (S.U) or more than 10.0 S.U. be allowed, unless the local limit allows such discharges.

c. Solid or viscous pollutants in amounts which may cause obstruction to the flow in the POTW or its wastewater collection system or may result in interference.

d. Any pollutant, including oxygen-demanding pollutants, discharged at a flow rate or pollutant concentration that will cause interference with the POTW or its wastewater collection system.

e. Heat in amounts which may inhibit biological activity in the POTW, resulting in interference. In no case shall heat in such quantities that the temperature at the POTW treatment plant exceeds 40° C (104° F) be discharged, unless the Department, upon request of the POTW, approves alternate temperature limits.



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F. Additional Conditions

- a. All discharges shall be in compliance with the terms and conditions of this permit. The discharge of any wastewater at a level in excess of that identified and authorized by this permit shall constitute a violation of the terms and conditions of this permit. Such a violation may result in the imposition of civil and/or criminal penalties as provided for in M.G.L. c.21, Section 42.
- b. After notice and opportunity for a hearing, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including, but not limited to, the following:
 - i. Violation of any terms or conditions of the permit;
 - ii. Obtaining a permit by misrepresentation or failure to disclose fully all relevant facts; or
 - iii. A change in conditions or the existence of a condition, which requires either a temporary or permanent reduction, or elimination of the authorized discharge.
- c. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges; nor does it authorize or relieve the permittee of any liability for any injury to private property or any invasion of personal rights; nor any infringement of Federal, State, or local laws or regulations; nor does it waive the necessity of obtaining any local assent required by law for the discharge authorized herein by the Department.
- d. The provisions of this permit are severable, and the invalidity of any condition or subdivision thereof shall not make void any other condition or subdivision thereof.
- e. All information and data provided by an applicant or a permittee identifying the nature and frequency of a discharge shall be available to the public without restriction. All other information (other than effluent data) which may be submitted by an applicant in connection with a permit application shall also be available to the public unless the applicant or permittee is able to demonstrate that the disclosure of such information or particular part thereof to the general public would divulge methods or processes entitled to protection as trade secrets in accordance with the provisions of M.G.L. c.21, Section.27(7). Where the applicant or permittee is able to so demonstrate, the Department shall treat the information or the particular part (other than effluent data) as confidential and not release it to any unauthorized person. Such information may be divulged to other officers, employees, or authorized representatives of the Commonwealth or the United States Government concerned with the protection of public water or water supplies.
- f. Transfer of Permits. Any sewer system connection permit authorizing an industrial discharge to a sewer system is only valid for the person to whom it is issued, unless prior to transfer:
 - i. The current permittee notifies the Department in writing at least 30 days in advance of the proposed transfer date; and
 - ii. The notice includes a written agreement between the existing and new permittees containing a specific date for transfer of permit responsibilities, and liability to the new permittee.
- g. This permit authorizing the discharge expires five (5) years from the date of issuance. The permittee shall apply for a renewal of this permit at least ninety (90) days prior to the expiration date, in accordance with 314 CMR 7.09(3)(b) for continued lawful discharges beyond the expiration date.
- h. All solids, sludge, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be collected, treated, and disposed of in accordance with applicable provisions in the following:
 - i. Hazardous waste regulations (310 CMR 30.000).
 - ii. Solid waste regulations (310 CMR 19.00).
 - iii. Sewer discharge regulations (314 CMR 7.00).
 - iv. Any other applicable federal, state and local laws.
- i. All samples shall be analyzed by a Massachusetts Certified Laboratory.
- j. The permittee shall provide the Department, and the Department's employees, authorized representatives and contractors, access at to the facility at all reasonable times, including during wastewater treatment system operation or wastewater discharge, for purposes of conducting activities related to oversight of this permit, including inspections to monitor compliance with the terms herein. The permittee shall allow the Department to obtain information related to compliance with the requirements of this permit. Notwithstanding any provision of this permit, the Department retains all of its access authorities and rights under applicable state and federal law.



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G. Certification Statement

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true accurate, and complete. I certify that this facility is in compliance with all conditions and requirements of this permit, and all applicable statutes and regulations. I further certify that systems to maintain compliance are in place at the facility or unit and will be maintained even if processes or operating procedures are changed. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations."

(I will be responsible for publication of public notice of the applicable permit proceedings identified under 314 CMR 2.06(1)(a) through (d).)

Brian Izzio

Printed Name of Applicant

Manager, Fab Continuous Improvement and Facilities

signature on original

Signature of Applicant

1/10/2008

Date Signed

Donald W. Alger

Name of Preparer

Senior Environmental Engineer

Title

508 854-5560

Phone Number

MassDEP Use Only

Special Conditions:

See Attachment 1

This document is a permit issued pursuant to Massachusetts General Laws, Chapter 21, Section 43 and Massachusetts regulations at 314 CMR 7.00. The permittee shall comply with all of the provisions contained in the permit application which are hereby incorporated and made part of this permit.

Date Issued

Permit Effective Date

Name of Regional BWP Section Chief

Permit Expiration Date

Signature



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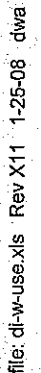
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Facility ID# (if known)

ATTACHMENT 1

Special Conditions:

1. The permittee shall maintain compliance with the City of Worcester's sewer use requirements and the terms and conditions of any applicable wastewater discharge permits issued by the Upper Blackstone Water Pollution Abatement District.
2. The permittee shall comply with the applicable Effluent Guidelines and Standards at 40 CFR, Chapter I, Subchapter N, Part 469 – Electrical and Electronic Components, and applicable subparts.
3. The permittee shall notify MassDEP of additional Effluent Guidelines and Standards as they are determined to be applicable to the facility.
4. The documents and materials attached to and referenced in the permit application are incorporated as part of the permit.

Allegro MicroSystems, Inc. - Worcester Plant
Reconciliation of Water Usage
 (Thousands of gallons per day, based on 2007 actuals)



III. WASTEWATER TREATMENT SYSTEM COMPONENTS & OPERATING CONTROLS

A. Overview

Wastewaters generated from Allegro process operations require pretreatment to meet the District wastewater discharge permit. Wastestreams from integrated circuits and semiconductor manufacturing operations are presently treated by a pH neutralization system prior to discharging to the District's wastewater facility.

Wastewaters from process operations flow by gravity to a 2080 gallon pH treatment process wastewater tank (TK-1) located in a pit below the wastewater treatment area. The waste stream is generally acidic, varying between 1.3 and 5.0 with slugs of high pH during regeneration of the deionized water (DI) system. The DI regenerant waste is currently being stored in a regenerant waste storage tank (TK-6) located outside the DI building. Low pH is primarily due to acids used in the manufacturing process. In the TK-1 tank a pH probe monitors wastewater pH and automatically signals the pH controller when caustic is required. Wastewater from tank TK-1 is pumped, with vertical centrifugal lift pumps (P1, P2, P3 and P4) to pH treatment buffer tank (T-2) and flows by gravity to pH treatment buffer tank T-3. In the buffer tanks a pH probe will monitor the pH of the contents and automatically signal the pH controller when acid or caustic is required.

Treated effluent subsequently flows by gravity to the District sewerage system or is pumped through an energy recovery heat exchanger that warms water feeding the DI water purification system. As required by the conditions of Allegro's existing discharge permit, a final effluent pH monitor with recorder and a sampling point are installed after the pH neutralization system and prior to discharge to the District sewerage system.

B. Treatment System Design

The pH treatment process is equipped to treat 600 gallons per minute instantaneous flow (840,000 GPD) which is greater than 120% of the design maximum daily flow of 157 gallons per minute (226,000 GPD) and the system average daily flow is typically 78 gallons per minute (113,000 GPD). The neutralization process has the capacity to deliver up to 3.4 lbmol

equivalents per minute of base to neutralize acids and to deliver up to 0.36 lbmol equivalents per minute of acid to neutralize bases. The system does treat hazardous industrial waste water and therefore is subject to the requirements of 310 CMR 30.605. The Facility has an Integrated Contingency Plan that addresses hazard assessment and emergency planning. The treatment system design as configured in January 2008 has been reviewed by Massachusetts Registered Professional Engineer (MAPE). If the treatment system is modified, its revised plans shall be reviewed, stamped and signed by a MAPE.

C. pH Treatment Process Wastewater Tank (TK-1)

Wastewater flows by gravity and regenerant waste is pumped to the pH treatment process wastewater tank TK-1. Tank TK-1 is located in a pit which is equipped with both an air diaphragm pump and an optional gasoline driven self-priming centrifugal pump to remove the spillage in case of an overflow. Tank TK-1 is equipped with one (1) pH probe and controller which controls chemical additions. Since the waste stream in tank TK-1 is acidic, and requires pH adjustment, caustic transfer pumps P-11 and P-12 are installed to recirculate a caustic stream that, when necessary, is added into TK-1. The controllers control the caustic feed to TK-1, with two controlled module valves. Each valve is controlled independently with its own pH probe and controller. One valve has a gradual open/close position while the other valve has only full open/close positions for more rapid addition.

D. Transfer Pumping Systems (P1, P2, P3 and P4)

The Transfer Pumping System consists of four vertical centrifugal lift pumps and six level sensors. The level sensors' LAL, CL, L1, L2, LWL and LAH are installed at 13", 19", 25", 31", 37" and 43" from bottom of the transfer tank respectively. When the wastewater level in the transfer tank, as measured by the tank level sensors CL, L1, and L2, reaches the respective operating level, the transfer pumps (P1, P2 and P3) will progressively turn on and transfer more wastewater from the transfer tank to the active pH neutralization tank (T-2). When the wastewater level in the transfer tank reaches the LWL level, the transfer pump P4 will also turn on and transfer wastewater to the pH neutralization tank (T-2) and the initial alarm will sound. When the wastewater level in the transfer tank reaches the LAH level, then the high level alarm

will sound. When the wastewater level in the transfer tank reaches the LAL level, then all the pumps will shut-off.

E. pH Neutralization System

1. General

The neutralization system is a double-stage treatment process utilizing two pH treatment buffer tanks (T-2 and T-3). Each buffer tank is equipped with a pH controller which controls chemical additions; acid/alkali feed piping for neutralization; and a mixer to ensure homogeneous reactions take place.

Each neutralization tank is a polypropylene tank with a working volume of 7000 gallons. Average daily flows vary between 50 and 150 gallons per minute (gpm) over a process day. Wastewater is transferred by the transfer pumping system to the neutralization tank T-2 at an average rate of 100 gpm, and higher flow rates up to 600 gpm maximum. Acid or alkali addition is determined based on the pH of the wastewater as detected by the pH controller. Wastewater is then transferred to the neutralization tank T-3 by gravity for further pH adjustment. From there wastewater flows to a holding tank then either through a plate and frame heat exchanger or directly to the discharge. Recovered heat is used to heat city water, which is used in the high purity water manufacturing process. The final effluent is then discharged to the District's sewer system. A final pH chart recorder, temperature chart recorder, Flow Totalizer and a sampling port are installed on the effluent pipe to monitor the effluent.

2. System Components & Controls

a. pH Treatment Process Wastewater Tank (TK-1)

Tank TK-1 has a maximum level capacity of approximately 2080 gallons with a length of 13'-4", width of 6'-3", and a height of 4'-0". The tank is constructed of polypropylene and equipped with six (6) level sensors (LAL, CL, L1, L2, LWL and LAH) to control the pumps. Four (4) vertical centrifugal lift pumps (P1, P2, P3 and P4) capable of transferring approximately 150 gpm each to the neutralization

tanks, are installed on the tank. The tank is also equipped with one (1) pH probe and controller which control chemical additions.

b. Regenerant Acid Waste Storage Tank (TK-6)

Tank TK-6 has a maximum level capacity of approximately 21,000 gallons with a diameter of 11'-9" and a height of 26'-8". The tank is constructed of fiberglass reinforced plastic (FRP) and equipped with two (2) centrifugal transfer pumps (P-5 and P-6) capable of transferring approximately 40 gpm of 4 wt% acid solution each to the neutralization tank T-2 for pH adjustment or, if necessary, for treatment.

c. pH Adjustment Tanks (T-2 and T-3)

Tanks T-2 and T-3 have a maximum level capacity of approximately seven thousand (7000) gallons with a diameter of 10'-4" and a height of 11'-10". Each tank is constructed of polypropylene and at a maximum process flow of 600 gpm can provide a retention time of approximately 20 minutes within the two tanks.

The contents of tanks T-2 and T-3 are agitated by top entry mixers M-1 and M-2 respectively, which have a 1/2 horsepower motor turning an impeller-type mixing blade. The mixer provides for complete contact of the influent wastewaters with the neutralization chemicals supplied by the chemical feed pumps. Both mixers are controlled by mixer "START" and "STOP" push bottoms located at the control panel. During normal operation the mixer is in the "START" selection. The operator can manually switch the mixer to either the "START" or "STOP" mode.

Tanks T-2 and T-3 are equipped with pH sensors/analyzers which continuously monitor the pH of the contents and provide the operator and chemical feed equipment with continuous information. Each pH sensor provides for feed forward automatic control for the introduction of either acid or alkali chemical supplied by chemical feed pumps P-10 or P-11 and P-12. All chemical feed pumps are March Manufacturing, Inc. Model TE-7.5K-MD with inlet size of 1-1/2" and outlet size of 1".

During normal operations the operator sets the chemical pumps in the "AUTO" operation mode. If the neutralization tank pH is below a preset low level, the pH controller will modulate the control valve for the caustic chemical feed line and allow introduction of alkali into tank T-2 or T-3. Conversely, if the pH of the waste stream is above a pre-set high level, the pH controller will modulate the control valve for the acid chemical feed line and allow introduction of acid chemical into tank T-2 or T-3. An adjustable "dead band" is provided on the pH controller to prevent the two control valves from cycling against each other. When the pH level is within the acceptable "dead band" pH range, neither control valve is activated.

If the normal power is lost, the emergency generator will provide power to operate the system. If the pressure in the compressed air line drops below 90 psi, nitrogen gas is fed through the line, serving as a backup. This allows the air diaphragm pump to operate. This pump will be activated if pumps P-1, P-2, P-3 and P-4 are unable to pump the wastewater out of tank T-1 causing it to overflow. A gasoline powered pump is also available to pump the wastewater if the diaphragm pump does not work.

After flowing through a heat exchanger, to recover heat for heating city water used to make high purity water, final neutralized wastewaters from the neutralization tank are continuously discharged to the District's sewer system.

d. System Operational Parameters

During normal operation of the neutralization system, the following operational parameters should exist:

- (1) The pH in tank TK-1 should be maintained between the desired range of approximately 2 and 14 standard units.
- (2) The pH in tank T-2 should be maintained between the desired range of approximately 3.5 and 10.75 standard units.
- (3) The pH in tank T-3 should be maintained between the desired range of approximately 6.5 and 10 standard units.

Under normal operation:

<u>Equipment</u>	<u>Operational Status</u>
P-1	"AUTO"
P-2	"AUTO"
P-3	"AUTO"
P-4	"AUTO"
P-13	"AUTO"
P-10	"AUTO"
P-11 or P-12	"AUTO"
M-1	"ON"
M-2	"ON"

e. Chemical Supply Equipment

The normal source of Sulfuric acid for pH adjustment is the 4% solution from the regenerant waste storage tank TK-6. If this waste acid is not available, Sulfuric acid from the bulk 93% storage tank is metered and diluted into reverse osmosis (RO) reject water to make a 4% solution for pH control. This solution is then supplied to the neutralization tank (i.e., T-2 or T-3) using chemical feed pump P-7.

Sodium Hydroxide is supplied from chemical storage day tank TK-5, which has a capacity of 900 gallons. The bulk caustic storage tank transfers the 50% sodium hydroxide to the caustic day tank (TK-5) where it is then diluted to 4% solution for pH control. Chemical feed pumps P-11 or P-12 recirculate hydroxide chemical solution from tank TK-5 through a loop that returns to the day tank or feeds to the wastewater tank (T-1) and/or the neutralization tanks (i.e., T-2 or T-3). Motorized control valve opening rates are preset and activated by the pH controller for chemical feed at the respective tanks T-1, T-2 and/or T-3.

Each motorized control valve has a pre-set opening rate. The valves are activated by a signal received by the valve from the pH controller for that neutralization tank.

F. Effluent Monitoring

Treated effluent from the Neutralization System will subsequently flow by gravity to the District's sewerage system. As required by the conditions of Allegro's existing District's permits, the discharge rate, temperature, volume and pH are logged by the wastewater treatment operator. Should the wastewater pH fluctuate outside the effluent limitations for more than 15 minutes, the operator will notify the District until the pH returns to an acceptable level.

